Cover Crops: Improving Soil Fertility in Africa

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John Eberlee

[Photo: *Mucuna* is used as a minor food crop in Ghana.]

Soil depletion and degradation are major problems leading to hunger and poverty in sub-Saharan Africa (SSA). The region's population exceeds 500 million people — almost half of whom live on less than US$1 per day — and is increasing by about 3% per year. Since the 1970's, food production across much of SSA has not kept pace with population growth. The results include increased pressure on the land, a decline in soil fertility, and an acceleration of desertification.

In the past, many African farmers maintained soil fertility by practising shifting cultivation or applying chemical fertilizers and herbicides on their fields. "But conditions have changed rapidly over the last decade," notes Daniel Buckles, a senior program officer at the International Development Research Centre (IDRC). For example, the productivity of traditional shifting agriculture systems has plummeted, while access to subsidized agro-chemicals is declining in many countries.

Alternative strategies

Today, the list of alternative strategies for improving soil fertility includes the use of compost, crop residues, animal manure, biomass, chipped wood, hedgerow intercropping (alley farming), and cover crops — such as legumes. With funding from IDRC's People, Land and Water program initiative, an information centre based in Benin is helping to spark interest in the latter as a means of halting the decline of African soils.

Launched in 1997, the Center for Cover Crops Information and Seed Exchange in Africa (CIEPCA) is involved in: (i) collecting and disseminating information on cover crops as well as organizations and individuals working with cover crops in Africa; and (ii) identifying, screening, multiplying, and disseminating cover crop seeds. CIEPCA was created in response to an October 1996 workshop on cover crops and green manure, held in Cotonou, Benin. The workshop was coordinated by the International Institute of Tropical Agriculture (IITA), the Benin-based Sasakawa 2000 aid project, and IDRC.

Sustainable agriculture

"At IITA, cover crops have been recognized for years as being critical to sustainable agriculture," says Robert Carsky, an IITA agronomist and CIEPCA project leader. "But it's hard to sell farmers on their benefits because they have to forgo planting food crops in order to grow cover crops."

When farmers do grow cover crops, "it's not always for soil fertility reasons," adds Dr Carsky. For example, more than 10,000 farmers in southern Benin are now using *Mucuna pruriens* — or velvetbean — a fast-growing plant that densely covers fallow fields, partly because it suppresses the tenacious weed, spear grass (*Imperata cylindrica)*. According to the 1998 IDRC publication, *Cover Crops in West Africa: Contributing to Sustainable Agriculture*, which is based on the Benin workshop, small-scale farmers are more likely to adopt cover crops when:

- they are grown on land that has few opportunity costs (for example, fields intercropped with food or commercial crops, land left fallow, land under tree crops, or during periods of expected drought, flooding, or freezing);
- their use requires very little additional labour (or saves labour by controlling weeds);
- seed is readily available at no out-of-pocket cost to the farmer; and
- their biomass (seeds, leaves, vines) provides benefits over and above improvements to soil fertility.

CIEPCA

One of the goals of CIEPCA is to promote research and disseminate information on the other benefits of cover crops — such as their potential as food, feed, and fuel sources — in order to help encourage their adoption. "Many traditional cover-crop systems involve legumes that are appreciated not only because they maintain soil fertility but also because the seeds or pods can be eaten by people," states *Cover Crops in West Africa*.

In Africa, *Mucuna* seeds are occasionally harvested for food and animal feed. Studies have shown, however, that some varieties contain L-Dopa — a chemical used to treat Parkinson's disease — and other potentially toxic compounds. In 1989, more than 200 people developed severe neurological symptoms during a drought in Mozambique, after drinking water that had been used to boil *Mucuna* seeds. And while cattle thrive on velvetbean meal, there are numerous reports of chickens, pigs, and other livestock becoming ill or dying after ingesting *Mucuna*.

Nutritional safety

Scientists in Africa and Canada are currently investigating the chemical composition of popular cover crop species to shed more light on their nutritional safety. Studies by IITA researchers, for example, indicate that L-Dopa can be reduced to levels that are safe for human consumption if *Mucuna* seeds are cracked, soaked in water overnight, boiled for 20 minutes, and then soaked overnight again. "However, toxicologists recommend several more toxicological tests for other possible antinutritional factors before the flour is launched for large-scale consumption," states *Cover Crops in West Africa*. Some of this work is now being done at the University of Ottawa.

Recent experience "leads us to think that cover crops can be viable and highly beneficial components of many cropping systems," concludes *Cover Crops in West Africa*. "Although the development of food and forage uses of cover crops is probably the most important challenge, it also offers a very important opportunity for soil-improvement practices to contribute to sustainable agriculture."

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